
3 Sample Reduction

Reducing A Sample To Test Size

Mechanical Splitter

Sand Splitter

Miniature Stockpile

Quartering

Size of Test Sample (After Splitting)

3 CHAPTER THREE: SAMPLE REDUCTION

REDUCING A SAMPLE TO TEST SIZE

The total sample must be reduced to a sample size that can be quickly tested. Time will not allow the technician to run the total sample. The key to sample reduction is to ensure that the sample remains representative of the material in the stockpile. This practice is commonly referred to as splitting a sample. Four different methods are used to reduce a sample to the proper test size.

- 1) **Mechanical Splitter** is the most accepted method of reducing to test size all coarse aggregate material smaller than gradation size No. 1, except highly moistened Compacted Aggregate.
- 2) **Sand Splitter** is the accepted method of reducing fine aggregate or the minus No. 4 material from compacted aggregate samples that is drier than the saturated-surface-dry condition. As a quick check to determine this, if the material retains its shape when molded in the hand, it is considered wetter than saturated-surface-dry.
- 3) **Miniature Stockpile** is the method used for fine aggregate that has free moisture on the particle surfaces.
- 4) **Quartering** is the method that is used for highly moistened Compacted Aggregate or when a mechanical splitter is not available.

Mechanical Splitter

The Mechanical Splitter “splits” the sample into halves as the material passes through the spaces between the bars in the splitter. The same number of each particle size will go into each half of the sample, thus keeping the reduced sample representative of the total collected sample.

In using the Mechanical Splitter, adjust the splitter bars to approximately twice the maximum particle size of the material to be split. A No. 5 aggregate has a maximum particle size of 1 1/2 in.. Therefore, the recommended bar opening should be 3 in. or 6 bars wide (each bar is approximately 1/2 in.). INDOT allows the bar opening at 3 in. (6 bars) for all coarse aggregate No. 5 or smaller. The splitter must be level to ensure that each half of the split is approximately the same size; within approximately 10 percent of each other by weight.

The splitting procedure is as follows:

- 1) Properly place the pans under the splitter in such a way that all of the particles diverting in both directions will be caught;
- 2) Pour the sample evenly into the hopper;
- 3) Open the hopper fully and allow the material to free fall through the splitter (If wet particles stick inside the splitter, gently tap the splitter with a rubber hammer to loosen them);
- 4) Place both halves of the sample back into the hopper and repeat the splitting operation to ensure that the sample has not been segregated during sampling; and
- 5) After the second splitting, the two receiving pans will contain approximately the same amount of material. Only one pan is placed back into the hopper and the splitting procedure repeated until a sample of the desired size is obtained. Skillful manipulation of the splitter will allow a sample of nearly any size to be made that is still representative of the material in the stockpile.

Sand Splitter

The sand splitter is a small version of the Mechanical Splitter except that the openings are fixed and there are no hopper doors.

The splitting procedure is as follows:

- 1) Place the pans under the splitter to catch all of the particles;
- 2) Slowly pour the dry sample into the splitter from the side (never from the end or corner);
- 3) Recombine the samples and split the sample a second time to eliminate any segregation; and
- 4) Reduce the sample to proper size by additional splitting of the material in one of the pans.

Miniature Stockpile

This method is used for reducing all samples of fine aggregates when the material is in a damp or moist condition. If the sample to be split is dry, then the material must be moistened before using this method.

The splitting procedure is as follows:

- 1) Place the original sample on a clean, dry plate or other hard, smooth, non-absorptive surface;
- 2) Using a trowel or other suitable tool, thoroughly mix the material to remove any segregation;
- 3) Shape the material into a conical pile; and
- 4) With a spoon or small trowel, randomly take at least five small portions of material around the pile and one-third way up the cone until the required test sample is obtained.

Quartering

Quartering is a non-mechanical method of reducing a sample. This is the best method of reducing highly moistened Compacted Aggregate or when a mechanical splitter is not available.

The quartering procedure is as follows:

- 1) Pour the sample in a conical pile in the center of a clean, dry, steel plate or other hard, smooth, non-absorptive surface;
- 2) Using a large trowel, shovel, or other suitable tool, thoroughly mix the material and reshape the sample into a conical pile;
- 3) Uniformly flatten the pile until the height is approximately equal to one-sixth the diameter;
- 4) With a large trowel or other suitable tool, divide the sample in half by vertically passing the tool through the center of the pile. In a similar manner divide each of these halves into two parts, thus “quartering” the sample; and

Combine diagonally opposite quarters of the material into two samples. Store one of these two halves. If the remaining material still weighs too much, repeat the entire quartering process until the proper test sample size is obtained.

SIZE OF TEST SAMPLE (AFTER SPLITTING)

The original sample must be reduced to test sample size which falls within the minimum and maximum weight in the following table.

WEIGHT OF TEST SAMPLE

AGGREGATE SIZE	MINIMUM	MAXIMUM
No. 2	11,300 g	---
No. 5	6,000 g	8,000 g
No. 8	6000 g	8000 g
No. 9	4,000 g	6,000 g
No. 11	2000 g	---
No. 12	1,000 g	---
No. 43	6000 g	8000 g
No. 53	6,000 g	8,000 g
No. 73	6,000 g	8000 g
No. 91	6000 g	8000 g
B Borrow	4000 g	6000 g
Structure Backfill: 1/2 in., 1 in., 1 1/2 in., and 2 in.	4,000 g	6,000 g
Structure Backfill: No. 4 & No. 30	300 g	---
Fine aggregate	300 g	---